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Measuring the User Experience of LMS CLASS-IPB Using the User Experience Questionnaire Method

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Abstract

This study conducts the measurement of user experience (UX) of the CLASS-IPB Learning Management System (LMS) using the User Experience Questionnaire (UEQ) method. The research was carried out through several stages, including a literature review, method determination, data collection, and data analysis using UEQ Data Analysis Tools. It involved 45 students who provided feedback on six UX aspects: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Results indicated that CLASS-IPB excels in pragmatic qualities, particularly in efficiency, perspicuity, and dependability, with scores above the benchmark average. However, the system scored lower in hedonic qualities, specifically in stimulation and novelty, suggesting areas for improvement. The study concludes that while CLASS-IPB is effective in aiding task completion and user control, it needs enhancements to become more motivating and innovative.

Keywords: UX, LMS, UEQ, CLASS-IPB, Pragmatic and Hedonic Quality

1. INTRODUCTION

Measuring effectiveness and user satisfaction in the context of educational technology is the process of evaluating how well a system or tool meets educational goals and user expectations. This measurement encompasses various aspects such as usability, performance, user satisfaction, and impact on learning outcomes [1].

One method that can be used to measure user experience is the User Experience Questionnaire (UEQ). UEQ is an evaluation tool designed to measure user experience in using interactive products. This method includes various dimensions such as attractiveness, clarity, efficiency, stimulation, and novelty. By using UEQ, researchers can gather relevant data on users' perceptions of a system, allowing for

the identification of areas needing improvement as well as aspects that already satisfy users [2][3][4].

In an increasingly digitized educational environment, Learning Management Systems (LMS) have become crucial tools supporting online learning and administrative tasks. LMS is a software platform designed to deliver, track, and manage educational and training programs. LMS provides various features such as the distribution of learning materials, assignment management, assessments, and communication between lecturers and students [5].

One of the LMSs used in Indonesia is CLASS-IPB (Course Learning and Academic Support System at Institut Pertanian Bogor). CLASS-IPB serves as a platform used by students and lecturers for various educational activities, ranging from course material management and assignment submissions to communication and collaboration. Given the importance of LMS in education, evaluating the effectiveness and user satisfaction of this system is essential to ensure that CLASS-IPB meets the needs of its users and supports a positive learning environment.

This evaluation needs to consider several key factors, such as the user interface, ease of access, system stability, features offered, and available technical support. The goal of this evaluation is to identify the strengths and weaknesses of the system and provide improvement recommendations to enhance future learning quality [6].

Several studies have investigated the user experience (UX) of LMS platforms using various methodologies. For example, Al-Fraihat et al. [1] conducted a comprehensive assessment of LMS platforms and emphasized the importance of usability and user satisfaction in determining the overall success of these systems. Similarly, a study by Islam [6] developed an e-learning evaluation model highlighting factors such as system quality, information quality, and service quality to measure LMS success. This study reinforces the importance of these aspects in determining the effectiveness and user satisfaction of LMS. Additionally, research by Azhari and Ming [7] also emphasized that students' background and experience in using online platforms have a significant impact on their satisfaction and academic achievement. While these studies provide valuable insights, they often lack a standardized approach to comprehensively measure UX [8].

The User Experience Questionnaire (UEQ) method has proven to be an effective tool for evaluating the UX of interactive products, including LMS. Schrepp et al. [2] demonstrated the effectiveness of UEQ in capturing various user perceptions, from usability to emotional responses. Studies by Hinderks et al. [9] and Saleh et al. [10] strengthen the validity and relevance of UEQ in the educational context,

revealing that this method can identify detailed aspects of user satisfaction and areas for improvement.

Although previous studies are comprehensive, there is a significant gap in the application of the UEQ method specifically to CLASS-IPB. Previous research, such as that conducted by Al-Fraihat et al. [1], often focuses on generic LMS platforms without addressing institution-specific systems like CLASS-IPB. Additionally, research by Alsabawy et al. [11] emphasizes the importance of system and service quality in LMS generally without specializing in a specific institutional context. Cheng [12] also shows that factors such as usability and user satisfaction in LMS are more often researched on a broader scale and not specifically at institutions. While existing literature highlights the importance of usability and satisfaction, there is limited empirical data on how these factors affect user experience in the context of CLASS-IPB.

This research aims to fill this gap by using the UEQ method to measure the user experience of CLASS-IPB. The uniqueness of this research lies in its focus on institution-based LMS, providing tailored insights that can directly inform improvements and strategic decisions at IPB. Additionally, this study will contribute to a broader understanding of user experience in the use of learning management systems (LMS) by specifically analyzing CLASS-IPB. Therefore, the goal of this research is to establish relevant benchmarks and identify unique aspects of user experience in the specific institutional environment of IPB.

The main research question guiding this study is: "How do users rate their experience using CLASS-IPB, as measured by the User Experience Questionnaire?" To answer this question, the study will:

1. Measure the overall UX of CLASS-IPB using the UEQ framework.
2. Identify specific strengths and weaknesses of CLASS-IPB from the users' perspective.

By answering these questions, this research is expected to provide actionable insights to improve the CLASS-IPB system, ensuring that it effectively meets user needs and enhances the overall learning experience at IPB.

2. METHODS

This study utilized the User Experience Questionnaire (UEQ) method, conducted through several stages as depicted in Figure 1 [13].

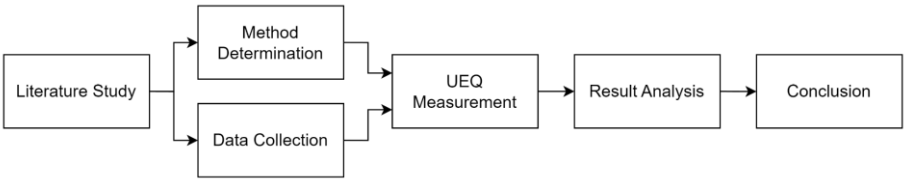

Figure 1. Research Stages

2.1. Literature Study

The first stage of this research involved a review of literature specifically focused on the assessment of usability and user experience. This process included examining previous research and authoritative texts to establish the theoretical foundation for evaluating user experience.

2.2. Method Determination

Following the literature review, the next phase of the research involved selecting a method for measuring user experience. Based on the insights gained from the literature review, the User Experience Questionnaire (UEQ) method was chosen to assess user experience in LMS CLASS-IPB. This study utilized the UEQ instrument, which consists of 26 pairs of contrasting items, each rated on a seven-point scale. The full UEQ instrument used in the study is shown in Figure 2.

2.3. Data Collection

The measurement of LMS CLASS-IPB user experience was conducted using the UEQ. Quantitative data were collected by distributing online questionnaires to 45 students. Google Forms was used to create and distribute the UEQ questionnaire, which consisted of 26 items based on the UEQ instrument.

2.4. UEQ Measurement

The UEQ method serves as a tool for usability testing, aiming to deliver an extensive and practical assessment of usability and user experience via a subjective quality evaluation survey. By using the UEQ, it is possible to identify areas where improvements can significantly impact the overall user experience. The UEQ includes six scales, encompassing 26 elements, categorized as follows:

1. Attractiveness: Measures the system's appeal to users, indicating whether they find it likable or unlikable.
2. Perspicuity: Measures how clear and understandable the system is for users, determining if it is easy or hard to comprehend.

3. Efficiency: Measures the system's effectiveness in helping users complete tasks quickly and practically, judging whether it is efficient or inefficient , fast or slow.
4. Dependability: Measures the system's reliability in allowing users to control their interactions, indicating if it is predictable or unpredictable, supportive or obstructive.
5. Stimulation: Measures the system's ability to motivate users, assessing if it is useful or less useful, interesting or uninteresting.
6. Novelty: Measures the system's creativity and innovation, evaluating whether it is creative or uncreative, conservative or innovative.

	1	2	3	4	5	6	7		
annoying	O	O	O	O	O	O	O	enjoyable	1
not understandable	O	O	O	O	O	O	O	understandable	2
creative	O	O	O	O	O	O	O	dull	3
easy to learn	O	O	O	O	O	O	O	difficult to learn	4
valuable	O	O	O	O	O	O	O	inferior	5
boring	O	O	O	O	O	O	O	exciting	6
not interesting	O	O	O	O	O	O	O	interesting	7
unpredictable	O	O	O	O	O	O	O	predictable	8
fast	O	O	O	O	O	O	O	slow	9
inventive	O	O	O	O	O	O	O	conventional	10
obstructive	O	O	O	O	O	O	O	supportive	11
good	O	O	O	O	O	O	O	bad	12
complicated	O	O	O	O	O	O	O	easy	13
unlikable	O	O	O	O	O	O	O	pleasing	14
usual	O	O	O	O	O	O	O	leading edge	15
unpleasant	O	O	O	O	O	O	O	pleasant	16
secure	O	O	O	O	O	O	O	not secure	17
motivating	O	O	O	O	O	O	O	demotivating	18
meets expectations	O	O	O	O	O	O	O	does not meet expectations	19
inefficient	O	O	O	O	O	O	O	efficient	20
clear	O	O	O	O	O	O	O	confusing	21
impractical	O	O	O	O	O	O	O	practical	22
organized	O	O	O	O	O	O	O	cluttered	23
attractive	O	O	O	O	O	O	O	unattractive	24
friendly	O	O	O	O	O	O	O	unfriendly	25
conservative	O	O	O	O	O	O	O	innovative	26

Figure 2. UEQ Instruments

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3. RESULTS AND DISCUSSION

3.1. Data Analytic

The data analysis for the UEQ questionnaire was performed using the UEQ Data Analysis Tools. This tool computes an average score reflecting users' perceptions of the system. Responses gathered from the questionnaire were input into the UEQ Data Analysis Tools, which involves multiple stages [13].

1) Data Transformed

The data from respondents is first entered into Excel, where it undergoes a conversion process. This process randomizes the order of values in the questionnaire (placing positive values on the right and negative values on the left) to minimize response bias, as shown in Figure 3.

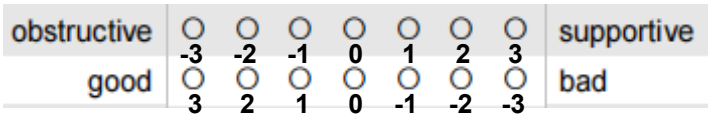

Figure 3. Data Conversion

Figure 3 illustrates the process of ordering values to minimize response bias for each item. The transformed data will then yield an average value per respondent, categorized by various aspects. The formula for calculating the average data conversion is as follows:

$$\underline{x} = \frac{\sum \underline{x}\ [person]}{\sum item} = \ldots \quad (1)$$

Description:

$\underline{x}$ = *Individual Scale Average*

$\sum \underline{x}\ [person]$ = *Total item scale*

$\sum item$ = *Number of Item Scale*

2) UEQ Findings

The recalculation of average data conversion results yields the primary UEQ outcome, serving as the benchmark for further calculations. Both the overall and

assumption scales are derived from the average value and variance of these conversion results. Intermediate scale results are considered normal if they fall within the expected range of -0.8 to 0.8. The formula for computing these results is provided below.

$$\underline{x} = \frac{\sum \underline{x}\ [person]}{\sum item} = \ldots \quad (2)$$

Description:

$\underline{x}$ = *Individual Scale Average*

$\sum \underline{x}\ [person]$ = *Total item scale*

$\sum item$ = *Number of Item Scale*

3) Set Data Benchmark

The UEQ approach utilizes benchmark criteria, dividing the test outcomes into six categories: Bad, Below Average, Average, Above Average, Good, and Excellent. The precise values for each category are provided in Table 1.

Table 1. UEQ Data Analysis Tool Categories

No	Aspect	Category				
		Excellent	**Good**	**Above Average**	**Below Average**	**Bad**
1	Attractiveness	≥1.75	≥1.52 <1.75	≥1.17 <1.52	≥0.7 <1.17	<0.7
2	Perspicuity	≥1.9	≥1.56 <1.9	≥1.08 <1.56	≥0.64 <1.08	<0.64
3	Efficiency	≥1.78	≥1.47 <1.78	≥0.98 <1.47	≥0.54 <1.52	<0.54
4	Dependability	≥1.65	≥1.48 <1.65	≥1.14 <1.48	≥0.78 <1.52	<0.78
5	Stimulation	≥1.55	≥1.31 <1.55	≥0.99 <1.31	≥0.5 <1.52	<0.5
6	Novelty	≥1.4	≥1.05 <1.4	≥0.71 <1.05	≥0.3 <1.52	<0.3

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The explanation for each category is:

1) Excellent: Falls within the top 10% of results,
2) Good: Better than 10% of results, worse than 75%,
3) Above Average: Better than 25% of results, worse than 50%,
4) Below Average: Better than 50% of results, worse than 25%,
5) Bad: Falls within the bottom 25% of results

3.2. Result Analysis

45 sets of respondent answers for each question attribute in the Google Form are entered into the "Data" tab in the DAT, where the answer values still represent points on a scale from 1 to 7, as shown in Table 2.

Table 2. Partial Results from UEQ Questionnaire

NO	Question Attribute								
	1	**2**	**3**	**4**	**…**	**23**	**24**	**25**	**26**
1	6	7	3	2	...	1	3	2	7
2	6	7	2	2	...	2	2	2	5
3	5	7	1	3	...	2	4	2	3
4	5	4	3	3	...	1	4	1	6
5	4	6	4	2	...	3	3	3	3
6	4	7	3	1	...	4	3	3	5
7	4	7	4	2	...	2	5	4	5
8	4	5	3	3	...	3	4	2	3
9	6	5	4	5	...	2	2	3	7
10	6	4	2	5	...	3	4	2	3
...	...	...	...	...	...	...	...	...	...
36	5	6	4	3	...	3	4	3	4
37	5	5	5	3	...	3	3	4	5
38	6	7	2	4	...	4	3	3	6
39	4	4	3	3	...	3	4	2	6
40	6	5	3	4	...	2	4	1	5
41	5	5	3	4	...	2	3	3	4

Afterward, DAT will perform calculations to evaluate the level of UX using UEQ statistical calculations. However, to understand these calculation results, analysis of the collected data is necessary. This analysis process includes evaluating the reliability and consistency of respondents' answers. Reliability testing is conducted to determine whether the questionnaire can be relied upon as a data collection tool and whether it can provide consistent and accurate information.

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Table 3. Partial Transformed Data Results from UEQ Questionnaire

NO	Question Attribute								
	1	**2**	**3**	**4**	**…**	**23**	**24**	**25**	**26**
1	2	3	1	2	...	3	1	2	3
2	2	3	2	2	...	2	2	2	1
3	1	3	1	1	...	2	0	2	-1
4	1	0	1	1	...	3	0	3	2
5	0	2	0	2	...	1	1	1	-1
6	0	3	1	3	...	0	1	1	1
7	0	3	0	2	...	2	-1	0	1
8	0	1	1	1	...	1	0	2	-1
9	2	1	0	-1	...	2	2	1	3
10	2	0	2	-1	...	1	0	2	-1
...	...	...	...	...	...	...	...	...	...
36	1	2	0	1	...	1	0	1	0
37	1	1	-1	1	...	1	1	0	1
38	2	3	2	0	...	0	1	1	2
39	0	0	1	1	...	1	0	2	2
40	2	1	1	0	...	2	0	3	1
41	1	1	1	0	...	2	1	1	0

Table 4. Reliability Test

Assessment Aspects	Cronbach Alpha (α)	Information
Attractiveness	0.60	Reliable
Perspicuity	0.62	Reliable
Efficiency	0.60	Reliable
Dependability	0.63	Reliable
Stimulation	0.57	Not Reliable
Novelty	0.51	Not Reliable

The significance of cronbach's alpha in evaluating each assessment aspect, such as attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty, lies in assessing the consistency of data provided by respondents. Table 4 shows that there are still cronbach's alpha values < 0.60, indicating that the aspects related to stimulation and novelty assessments are not reliable and must be removed to ensure the overall data is reliable. Since there are scales that still exhibit unreliability, it is imperative to remove certain respondent data, particularly those containing inconsistent responses. This step is crucial to enhance the accuracy and reliability of the analysis, ensuring that the conclusions drawn from the data are robust and trustworthy. The data removal was done using Inconsistencies Tools in DAT. Lihat table 6 setelah beberapa data yang masih inkonsisten dihapus. See Table 6 after some inconsistent data has been removed.

Table 6. Reliability test after some inconsistent data is removed

Assessment Aspects	Cronbach Alpha (α)	Information
Attractiveness	0.61	Reliable
Perspicuity	0.60	Reliable
Efficiency	0.67	Reliable
Dependability	0.66	Reliable
Stimulation	0.66	Reliable
Novelty	0.61	Reliable

Table 5 shows that the cronbach's alpha value, after some inconsistent data were removed, indicates that the overall data is now reliable. Of the 45 data points previously available, it has now been reduced to 41 data points, resulting in an 8.7% reduction in data. After confirming the inconsistency scale of the respondents' answers, we proceeded to analyze the average impressions of the various scales, as illustrated in Figure 4.

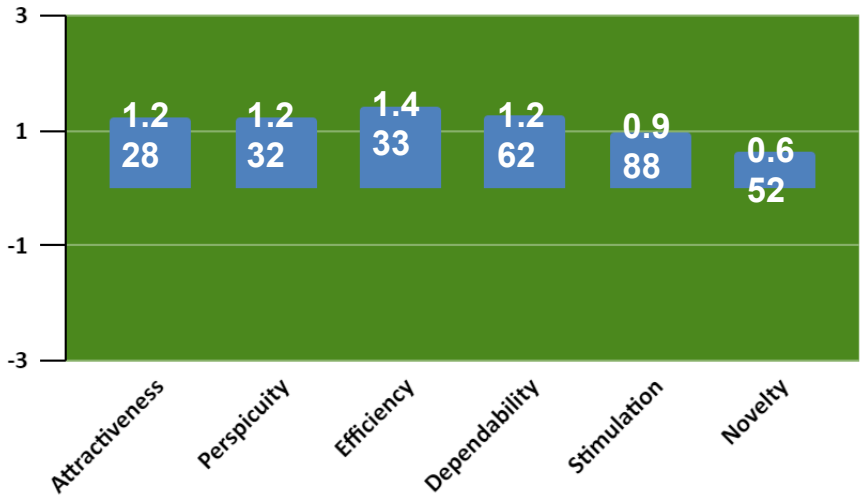

Figure 4. Average graph of impressions of 6 Scales

Based on Figure 4, the attractiveness scale shows a positive average score of 1.228, indicating that respondents generally favor LMS CLASS-IPB. The perspicuity scale also reflects a positive average score of 1.232, suggesting that users find the system easy to understand. The efficiency scale stands out with a high positive average score of 1.433, implying that LMS CLASS-IPB enables users to complete their tasks effectively and efficiently. The dependability scale, with a positive average score of 1.262, indicates that users feel in control when using the system. However, the stimulation scale scores lower, with an average value of 0.988, and the novelty scale has an even lower average value of 0.652. These results suggest

that LMS CLASS-IPB lacks in motivating users and does not offer innovative features. The overall scores will be further analyzed to evaluate the system's pragmatic and hedonic qualities. Pragmatic qualities encompass perspicuity, efficiency, and dependability, while hedonic qualities include stimulation and novelty. The detailed assessment of these qualities is presented in Table 7.

Table 7. Pragmatic and Hedonic Quality

No	Aspect	UEQ Aspect	UX Aspect	UEQ Scale Score
1	Attractiveness	1.23	Attractiveness	1.228
2	Pragmatic Quality	1.31	Perspicuity	1.232
			Efficiency	1.433
			Dependability	1.262
3	Hedonic Quality	0.82	Stimulation	0.988
			Novelty	0.652

According to Table 7, the highest score in the pragmatic quality aspect is efficiency, with a value of 1.433. This suggests that LMS CLASS-IPB allows users to perform tasks quickly and efficiently. Attractiveness, scoring 1.228, indicates that users find the system visually appealing. Dependability, with a score of 1.262, shows that users feel they can reliably manage the system. Perspicuity, which has a score of 1.232, indicates that the system is straightforward and easy for users to understand.

However, the hedonic quality aspect has a lower value of 0.82. The stimulation score is 0.988, showing that the system is not very motivating for users. The novelty score is 0.652, indicating a lack of innovative features. Overall, while LMS CLASS-IPB scores above average in attractiveness, efficiency, dependability, and perspicuity, reflecting its practical usability, it falls short in providing a stimulating and novel user experience, indicating areas for improvement.

The study's findings indicate that all assessed aspects received positive values, with each UX aspect scoring above 0.8. According to the evaluation criteria, an impression score between -0.8 and 0.8 is considered normal, a score above 0.8 is deemed positive, and a score below -0.8 is regarded as negative [14]. Furthermore, a benchmark analysis will be performed to compare these results with those from similar studies [15].

Table 8. Benchmark Comparison

Scale	Mean	Comparison to Benchmark	Explanation
Attractiveness	1.23	Above Average	Better than 25% of results, worse than 50%

Scale	Mean	Comparison to Benchmark	Explanation
Perspicuity	1.23	Above Average	Better than 25% of results, worse than 50%
Efficiency	1.43	Above Average	Better than 25% of results, worse than 50%
Dependability	1.26	Above Average	Better than 25% of results, worse than 50%
Stimulation	0.99	Below Average	Better than 50% of results, worse than 25%
Novelty	0.65	Below Average	Better than 50% of results, worse than 25%

Based on Table 8, the efficiency scale received the highest rating, while the novelty scale received the lowest rating. This indicates that the novelty aspect of the user experience needs improvement. The benchmark data set results are subsequently transformed into a graphical diagram to aid in the visualization of each scale's evaluation. The chart illustrating the benchmark data set results is presented in Figure 5.

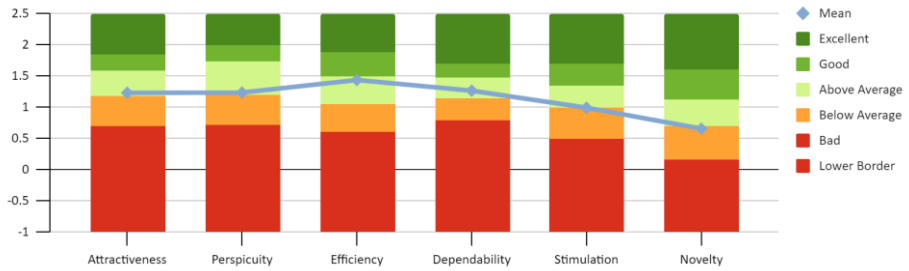

Figure 5. Average graph of impressions of 6 Scales

Figure 5 displays a set of standard benchmarks. Both the attractiveness and perspicuity scales have an average score of 1.23. The efficiency scale has an average score of 1.43, and the dependability scale shows an average score of 1.26. In contrast, the stimulation scale has a lower average score of 0.99, and the novelty scale has an average score of 0.65. These benchmark results indicate that while most scales are above average, the stimulation and novelty scales fall below average.

4. CONCLUSION

The measurement of user experience with LMS CLASS-IPB reveals strong pragmatic qualities, as all UX aspects score positively above 0.8. The efficiency scale stands out with the highest score of 1.433, indicating that users perceive the system as aiding them in completing tasks quickly and easily. Other scales such as attractiveness, dependability, and perspicuity also score well above average, indicating the system's practical usability and user-friendliness. However, the hedonic qualities, encompassing stimulation and novelty, receive lower scores of 0.988 and 0.652, respectively. This suggests that the system lacks the ability to sufficiently motivate users and lacks innovative features. Compared to benchmark data, LMS CLASS-IPB's pragmatic qualities surpass the average, with 25% of similar systems performing better and 50% performing worse. In contrast, its hedonic qualities fall below average, with 50% of similar systems outperforming in terms of stimulation and novelty. This analysis suggests that while LMS CLASS-IPB is effective and user-friendly, it requires enhancements in its ability to engage users and introduce innovative features to enrich the overall user experience. Recommendations for improvement include developing new, more engaging, and innovative features, as well as refining design elements to increase user motivation.

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